

CROSS CONNECTION CONTROL RECERTIFICATION OF TESTERS

This letter is to confirm that your application for renewal of your backflow prevention device testers certification card has been received by this office. However, in order for this request to be granted you will have to comply with the following instructions and guidelines.

1. Contact one of the state sponsored regional certification renewal facilities. The attached sheet shows a complete list with locations, addresses and phone numbers.
2. Study the enclosed information prior to showing up for the recertification process.
3. A nominal fee, not to exceed fifty dollars (\$50.00) may be charged by the testing agency or agent for this service.
4. Upon completion of all phases of the recertification process, your paper work will be sent to the DHEC Central Office in Columbia for review. If everything is in order then a new tester's certification card will be printed and mailed to you, along with other related materials.

If you should have additional questions please feel free to call (803) 898-3567 and ask for the Cross Connection Control Program Coordinator.

SATELLITE WET LABS

All applicants for renewal will have to go through the testing requirements as prescribed by this office at one of the regional wet labs prior to receiving any renewal of their testing card or certification number from this office.

This procedure will include five (5) requirements for the testers to complete.

1. Your differential gauge will be tested for accuracy by the proctor or examiner at the regional wet lab testing site. (If the gauge is out of tolerance it will have to be sent back to the factory or some other qualified company and brought back into accuracy of 2 per cent of scale. This translates into plus or minus .3 PSID).

2. Applicants will be required to take a brief written exam of about twenty five (25) questions. Applicants must obtain a score of 70 % or better in order to pass.

3. Applicants must test one RP assembly (preferably with applicants own gauge).

4. Applicants must test one DCVA with the vertical tube method. (Tester should own a vertical tube, but this is not currently a requirement).

5. Applicants must test one PVB (preferably with applicants own gauge). (No back-pressure test acceptable, only direction of flow or differential pressure test.)

If applicant passes all phases of this test then his paper work will be forwarded to DHEC for processing. If all criteria are met then a new certification card will be issued and mailed to applicant. This process will have to be repeated in three years from date of renewal.

BACKFLOW PREVENTION RE-CERTIFICATION STATIONS

Below is a listing of all of the current re-certification stations for backflow prevention assembly testers in South Carolina.

You are free to select the one of your choice and make arrangements to participate in the renewal process. You may receive additional information by calling the number of the station of your selection. The proctor will provide you with dates, costs, and locations of the next scheduled exam.

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ZORN CONSULTING, LLC
325 BANNING STREET
COPE, SC 29038
(803) 536-6387 OR (803) 707-8153

MR. CHARLES CLINEMYER, JR
GREENWOOD C.P.W.
P.O. BOX 549
GREENWOOD, SC 29648
(864) 942-8196

MR. HARRY PEART
ROCK HILL AREA
214 TWIN LAKES ROAD
ROCK HILL, SC 29732
(803) 324-0927 OR (803) 417-1014

MR. J.T. JOHNSON
JOHNSON BACKFLOW PREVENTION
420 BEVERLY DRIVE
CHERAW, SC 29520
(843) 537-4230

MR. DALE STRONG
CHARLESTON C.P.W.
103 ST. PHILIP STREET
CHARLESTON, SC 29403
(843) 727-6981

MR. ALVIN ARD
CITY OF FLORENCE RR
180 NORTH IRBY STREET
FLORENCE, SC 29501
(843) 665-3236

MR. ED MAKISON
ANDERSON REGIONAL WATER
998 HUNTERS TRAIL
ANDERSON, SC 29625
(864) 332-0279 OR (864) 332-6534

MR. ALEX CRIBB
CITY OF GEORGETOWN
P.O. DRAWER 939
GEORGETOWN, SC 29442-0939
(843) 545-4511

MS. ANN WOOD
CITY OF COLUMBIA
2910 COLONIAL DRIVE
COLUMBIA, SC 29203
(803) 545-3876

MR. KENNETH DAVIS
INMAN CAMPOBELLO WATER
5 PROSPECT STREET
INMAN SC 29349
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STUDY SHEET FOR RECERTIFICATION TEST

The primary responsibility for implementing and maintaining the drinking water protection program (including the cross connection control program) rests with the water purveyor. Courts have ruled that the town, city, commission, or district which sells and purveys (distributes) the water is the water purveyor, and the responsibility of complying with state, federal, and local laws and ordinances rests with the water purveyor.

In SC there are only two approved methods of testing a double check valve assembly. The **direction of flow test** with the vertical tube or differential gauge using one hose or **differential pressure test** using a differential gauge and two hoses. When testing a dcva with the vertical tube the critical level of the tube must be located at the outlet level of the downstream test cock that is open. The vertical tube test creates one PSI of pressure on the supply side of each check valve by filling the vertical tube to a level of 27 and $\frac{3}{4}$ " or 28".

The pressure vacuum breaker must be installed 12" above any downstream plumbing or sprinkler head. The pvb is designed for health/high hazard backsiphonage and is not approved or designed for backpressure. The pvb works under continuous pressure meaning you can have a downstream shut-off valve installed on a pvb. The air inlet valve and check valve inside the pvb both must be greater than 1.0 psi. Finally, the pvb is required to be tested annually where the atmospheric vacuum breaker does not. The avb must be installed 6" above any downstream plumbing or sprinkler head.

An air gap is considered to provide even a higher degree of protection than an R.P. An approved air gap must always be two times the supply pipe diameter and never less than one inch. However, the R.P. is the best **mechanical** backflow prevention assembly for a high or health hazard cross connection.

When testing a reduced pressure principle assembly, the pressure differential relief valve must operate to maintain the zone between the two check valves at least **2.0 psid** less than supply pressure. Also, the second check valve on a reduced pressure principle assembly must be **1.0 psid or greater**. When testing the first check valve on a reduced pressure principle assembly, the acceptable value is **5.0 psid or greater**. If the differential pressure drops below 5.0 psi when testing the first check valve, it must be repaired and retested. If the relief valve is discharging water under a flowing and non-flowing condition the most obvious problem is a fouled relief valve.

STUDY SHEET PAGE #2

In testing the # 2 check valve on the R.P., if trash is caught in the # 2 check valve and it is leaking because of back-pressure from the customers facility this should cause pressure in the zone to increase, thereby causing the differential gauge to fall, and eventually the zone will begin to discharge or dump water from the relief valve.

An approved DCVA is designed and approved to protect the public water supply system from a " low hazard or non health hazard " category cross connection. Both check valves in a DCVA must hold **1.0 psid** or greater.

An approved R.P. and Air Gap are designed and approved to protect the public water supply system from a " high hazard or health hazard " category cross connection.

Backpressure occurs when the customers internal water pressure exceeds the supply pressure. Backsiphonage occurs when the potable or drinking water supply drops below atmospheric pressure, which is 14.7psi at sea level. Thermal expansion is created when the temperature in a closed plumbing system increases.

Since January 1, 1992, DHEC has required the use of resilient seated ball valves on all R.P.'s and DCVA's from ½ up through the size of 2", and the use of resilient wedge gate valves on all R.P.'s and DCVA's in size 2 ½ and larger.

When testing a double check valve assembly with a differential gauge and you use both the high hose and low hose, this test procedure is called **differential pressure**. The only shut-off valve you will close on the dcva when performing the differential pressure test is the #2. The #1 shut-off valve must remain open to perform this differential pressure test.

The pressure vacuum breaker must be tested with a differential gauge and one hose which we call the direction of flow test. When testing the air inlet valve the high hose must be connected to test cock #2. However, when testing the check valve the high hose must be connected to test cock #1.

This study sheet is not designed to cover every question which is found on the recertification test. Neither is it meant to cover all of the information which is covered in the DHEC sponsored three day certification seminar. There are a number of questions pertaining to trouble shooting and testing the RP, PVB, and DCVA, as well as some general knowledge questions which you, as a tester are expected to already know. If you have been properly testing assemblies in the past you will not have any problems with those questions. If you have not been properly testing, diagnosing, and repairing assemblies then the place to be retrained for that is in the three day seminar. The purpose of the recertification testing is not to teach the course over again, but to allow qualified testers to prove their qualifications.

STATE PRIMARY DRINKING WATER REGULATIONS
AS AMENDED APRIL 29, 2005
R.61-58.7(F)

F. Cross Connection Control

(1) General

(a) All public water systems shall initiate and maintain a viable cross connection control program. Such a program shall consist of:

- (i) Locating and eliminating unprotected cross connections.
- (ii) Maintaining records pertaining to the location of existing backflow prevention assemblies, type and size of each assembly and annual test results.

(b) No person shall install, permit to be installed or maintain any cross connection between a public water system and any other non-public water system, sewer or a line from any container of liquids or other substances, unless an approved backflow prevention device or assembly is installed between the public water system and the source of contamination.

(2) Low Hazard Cross Connections

A connection between an approved public water system and another water source not hazardous to health but not meeting the standards of the approved public water system and not cross-connected within its system with a potentially dangerous substance shall be considered a low hazard category cross connection. At a minimum, an approved Double Check Valve Assembly or Pressure Vacuum Breaker must be installed on a low hazard cross connection except as provided for in section 3 below.

(3) Residential Lawn Irrigation Systems

(a) Low hazard residential lawn irrigation systems - Each public water system which has low hazard residential irrigation systems directly or indirectly connected to their public water system must have a written low hazard residential lawn irrigation system cross connection control policy. This policy must be documented in writing and must be approved by the governing body of the public water system. The policy must specify the minimum acceptable device for low hazard residential lawn sprinkler systems. The minimum acceptable device for low hazard residential lawn sprinkler systems is a residential dual check. If a water system specifies another backflow prevention assembly as the minimum acceptable protection for these cross connections, the policy must be approved by the governing body of the public water system with due opportunity being provided for public comment and participation. The written policy must:

- (i) Identify the type of backflow prevention device or assembly that is required to be installed on low hazard residential lawn irrigation system connections.

(ii) Establish a schedule for the required testing of double check valve assemblies, or other testable assembly, if testable assemblies are designated by the policy as minimum acceptable protection for low hazard residential lawn irrigation systems. The minimum testing frequency must be specified in the policy and appropriate records must be maintained to verify compliance with the established testing requirements.

(iii) Establish a schedule for the required change out of residential dual checks if these are the devices designated by the policy as minimum acceptable protection for low hazard residential lawn irrigation systems. The minimum change out frequency must be specified in the policy and appropriate records must be maintained to verify compliance with the established change out requirements.

(b) High hazard residential lawn irrigation systems – Any residential lawn irrigation system that includes chemical addition, or is also connected to another water source which is not an approved public water system, shall be considered a high hazard cross connection and must meet the requirements of paragraph (4) below.

(4) High Hazard Cross Connections

(a) A connection between an approved public water system and a service or other water system which has or may have any material in the water dangerous to health, or connected to any material dangerous to health, that is or may be handled under pressure, or subject to negative pressure, shall be considered a high hazard category cross connection. Protection shall be by air gap separation or an approved reduced pressure principle backflow prevention assembly.

(b) Reduced pressure principle backflow prevention assemblies shall not be installed in any location subject to possible flooding. This includes pits or vaults which are not provided with a gravity drain to the ground's surface that is capable of exceeding the discharge rate of the relief valve.

(5) Fire Sprinkler Systems

Fire line sprinkler systems, except those in the high hazard category shall be protected by an approved double check valve assembly. High hazard fire sprinkler systems shall include, but not be limited to: antifreeze systems, foam systems, systems charged from or tied into ponds, lakes, streams, or any water source other than the approved public water supply. High hazard category fire sprinkler systems shall comply with the requirements of Paragraphs (4) above.

(6) Approved Devices and Assemblies

The Department shall prepare and publish a list of backflow prevention assemblies approved by the Department for use in S.C., and this list shall be updated at least once annually.

(7) Testing Requirements

When double check valve assemblies, pressure vacuum breakers, and/or reduced pressure principle backflow prevention assemblies are installed to protect a public water system against the possibility of backflow from a customer's water service, routine testing of the assemblies shall be performed by a certified tester.

- (a) Each assembly shall be tested by a certified tester after installation and before use by the customer. Except as specified in paragraph 3(a)(ii) above, each assembly shall be tested at least once annually by a certified tester.
- (b) The public water system is to receive a written report of the inspection and testing results for all assemblies tested within its distribution system. The report shall be submitted by the certified tester making the inspection and test.
- (c) All backflow prevention assemblies shall be tested immediately after repairs of any kind are made to the assembly.

(8) Backflow Prevention Tester Certification

There are four (4) types of certified testers of backflow prevention assemblies; General Tester, Limited Tester, Inspector Tester, and Manufacturer's Agent. The definition of each type of certified tester is specified in R.61-58(A).

- (a) Each certified tester's license shall expire three (3) years from the date of issue. In order to renew this certification for three (3) more years, the tester shall come before a designated person approved by the Department and shall successfully complete a written examination with a passing score of 70%, and perform the prescribed test on an approved reduced pressure principle backflow prevention assembly, double check valve assembly, and a pressure vacuum breaker using the tester's own differential pressure gauge. The gauge must be accurate within 2% of full scale or ± 0.3 pounds per square inch differential (PSID). Any gauge found to be inaccurate or malfunctioning will be required to be calibrated or repaired as needed to bring it into compliance before certification will be renewed.
- (b) Any applicant for certification who fails to properly perform the above prescribed tests will have his certification revoked immediately and will have to successfully complete the state sponsored backflow prevention training and certification course in order to become re-certified as a tester of backflow prevention assemblies in South Carolina.
- (c) A certified tester may have his tester's certification revoked due to incompetence or falsification of test results, as determined by the Department.
- (d) The Department shall reserve the right to charge or allow for the charge of a nominal fee for the administration of the recertification of testers. This fee shall not exceed fifty dollars (\$50.00).

(9) Installations of Pressure Vacuum Breakers

Where used, pressure vacuum breakers shall be installed at a minimum of 12" inches above the highest downstream piping and shall not be subject to backpressure.

BACKFLOW DEVICE TEST REPORT FORM

Date: _____

Account Name/Business Name: _____

Account Address: _____

Account Number: _____ Meter Number: _____

Device Name: _____ Model Number: _____

Serial Number _____ Size: _____

Device Location: _____

Tested by (PRINT) _____

	Check No. 1	Check No. 2	Air-Inlet Valve or Relief Valve	#1 Gate or Ball (Circle One)	#2 Gate or Ball (Circle One)
Test Before Repairs	(Mark One) Leaked _____ Closed _____ Tight _____	(Mark One) Leaked _____ Closed _____ Tight _____	Opened at _____ lbs. Differential Pressure	(Mark One) Leaked _____ Closed _____ Tight _____	(Mark One) Leaked _____ Closed _____ Tight _____
	Diff Press	Diff Press			
Repairs and New Materials					
Test After Repairs	(Mark One) Leaked _____ Closed _____ Tight _____	(Mark One) Leaked _____ Closed _____ Tight _____	Opened at _____ lbs. Differential Pressure	(Mark One) Leaked _____ Closed _____ Tight _____	(Mark One) Leaked _____ Closed _____ Tight _____
	Diff Press	Diff Press			

Above data certified to be correct.

Tester Signature: _____ Certification Number: _____

Company Name: _____ Company Telephone Number: _____

Category: _____ General _____ Limited _____ Inspector Tester: _____

Method of Testing: _____ Test Kit Used: _____

Comments: _____

DOUBLE CHECK VALVE ASSEMBLY TEST

(USING THE VERTICAL TUBE)

This testing procedure takes advantage of the fact that ONE PSI of pressure is created at the base of a 27 ¾" high water column. The tricky part of this test is that the pressure is applied on the up-stream (or supply) side of the check valve and in direction of flow rather than as back pressure.

A big advantage of this test is that it may be performed on assemblies which have a missing # 1 test cock or which may have a leaking # 1 shut off valve. A moderate amount of leakage past the first shut off valve can be tolerated since that leakage will simply spill out the top of the 27 ¾" water column. Also, a small test cock may be installed at the base of the water column which may be opened to allow the appropriate amount of water to spill out, maintaining the 27 ¾" level in the water column.

TEST PROCEDURE: (Check valve # 1)

1. OPEN AND CLOSE ALL TEST COCKS INDIVIDUALLY TO FLUSH OUT ANY SEDIMENT OR SCALE.
2. INSTALL VERTICAL TUBE ONTO TEST COCK # 2.
3. OPEN TEST COCK # 2 AND ALLOW WATER TO FILL THE TUBE. (A column of water 27 ¾" high creates 1 psi of pressure at its base) WHEN THE 27 ¾" TUBE IS FILLED, CLOSE TEST COCK # 2.
4. CLOSE SHUT-OFF VALVE # 1 AND # 2.
5. OPEN TEST COCK # 3 first; then open # 2. (Position the base of the tube at the same level as test cock # 3.) Some leakage will occur from test cock # 3 as water escapes from the body of the valve. However, if leakage continues to occur then water is passing through check valve # 1, **INDICATING A FAILURE OF CHECK VALVE # 1.**

***NOTE:** Leakage out of test cock # 3 should be accompanied by a fall in the water level of the vertical tube, unless shut-off valve # 1 is leaking enough to keep the vertical tube full and/or over flowing.

TEST PROCEDURE: (Check valve # 2)

- (A). CLOSE TEST COCKS # 2 AND # 3.
- (B). REMOVE THE VERTICAL TUBE FROM TEST COCK # 2 AND INSTALL IT ONTO TEST COCK # 3.
- (C). OPEN SHUT-OFF VALVE # 1 AND TEST COCK # 3 IN ORDER TO FILL THE VERTICAL TUBE TO THE 27 ¾" LEVEL.
- (D). CLOSE TEST COCK # 3 AND SHUT-OFF VALVE # 1.
- (E). OPEN # 4 TEST COCK FIRST; then open # 3. (Position the base of the tube at the same level as test cock # 4.) Some leakage will occur from test cock # 4 as water drains from the body of the valve. HOWEVER, IF LEAKAGE CONTINUES TO OCCUR THEN WATER IS PASSING THROUGH CHECK VALVE # 2, **INDICATING A FAILURE OF CHECK VALVE # 2.**

***NOTE:** Leakage out of test cock # 4 should be accompanied by a fall in the water level of the vertical tube, unless shut-off valve # 1 is leaking enough to keep the vertical tube full and/or over flowing.

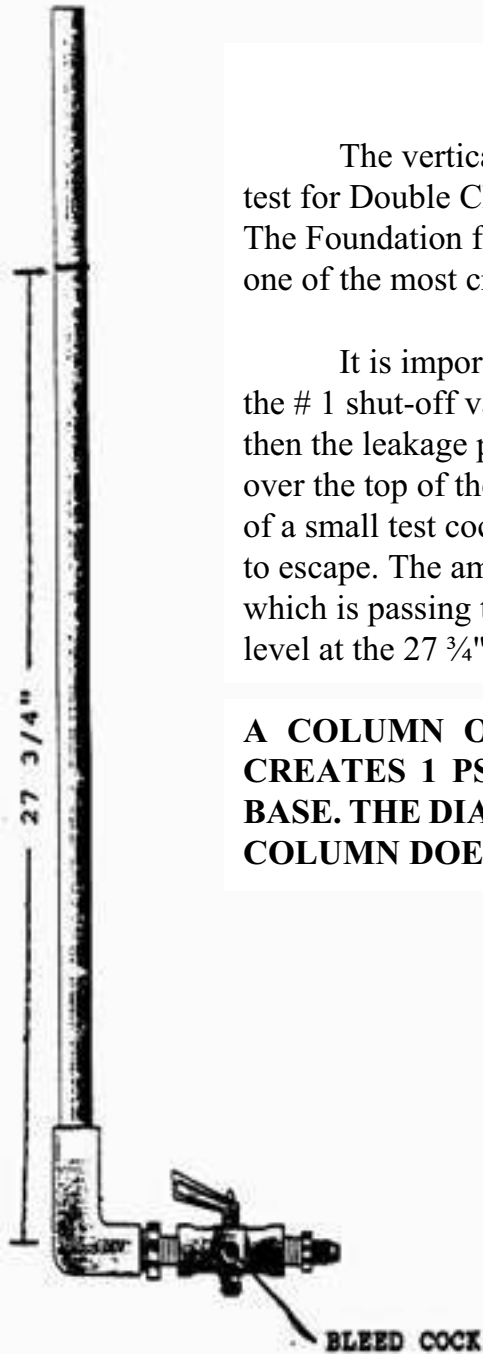
- (F). **CLOSE ALL TEST COCKS AND OPEN ALL SHUT-OFF VALVES BEFORE LEAVING THE ASSEMBLY.**

VERTICAL TUBE TEST

The vertical tube or water column test is one of the **BEST** prescribed test for Double Check Valve Assemblies. This test is recognized and endorsed by The Foundation for Cross Connection Control and Hydraulic Research as being one of the most credible procedures for testing the DCVA.

It is important to remember that the vertical tube test **can** be used when the # 1 shut-off valve is leaking slightly. If the tube is cut off at exactly $27 \frac{3}{4}$ " then the leakage past the # 1 shut-off valve can simply flow out to atmosphere over the top of the tube. If the vertical tube is over $27 \frac{3}{4}$ " tall then the installation of a small test cock at the base of the tube can be opened to allow for the leakage to escape. The amount of leakage which escapes must be the same as the amount which is passing through the # 1 shut-off valve in order to maintain the water level at the $27 \frac{3}{4}$ " level.

A COLUMN OF WATER $27 \frac{3}{4}$ " HIGH CREATES 1 PSI OF PRESSURE AT ITS BASE. THE DIAMETER OF THE PIPE OR COLUMN DOES NOT MATTER.



THESE DIRECTIONS ARE FOR THE THREE (3) VALVE TEST KIT
DOUBLE CHECK VALVE TEST
DIRECTION OF FLOW

IMPORTANT: SINCE THE GAGE AND LOW HOSE MUST BE HELD AT THE SAME LEVEL AS THE DCVA AND SINCE MANY SMALL SIZE DCVA'S ARE INSTALLED IN METER BOXES WITH VERY CLOSE SIDE CLEARANCES, THIS TEST MAY NOT BE ACCEPTABLE IN SUCH INSTANCES. IF SO, YOU MAY SUBSTITUTE THE VERTICAL TUBE TEST. THE THEORY AND PRACTICE ARE SIMILAR ON THESE TWO TESTS.

TEST PROCEDURE

Test Check Valve # 1

1. Close all valves on test kit.
2. Attach high hose of gage to test cock # 2.
3. Slowly open test cock # 2.
4. Open high "A" and vent "C" on test kit and bleed air from kit.
5. Close vent "C" valve on gage after air is expelled.
6. Close shut-off valve # 2 then # 1 (With both shut-off valves now closed some pressure is trapped inside of the DCVA.)
7. Open test cock # 3 (Test cock # 2 should still be open.)
8. At this point, the gage needle **must not drop below 1.0 psi.**
9. If the gage needle holds at **1.0 psi** or greater then the check valve is holding tight.

Test check valve # 2

1. Close test cocks # 2 and # 3 on the DCVA and close high "A" and vent "C" on the test kit.
2. Move the high hose from test cock # 2 to test cock # 3.
3. Open shut-off valve # 1 on the DCVA.
4. Slowly open test cock # 3 on DCVA.
5. Open high "A" and vent "C" valves to bleed air from the kit.
6. Close vent "C" valve on gage after air is expelled.
7. Close shut-off valve # 1 on the DCVA. (Pressure now trapped inside of the DCVA.)
8. Open test cock # 4. (Test cock # 3 should still be open.)
9. If the gage needle holds at **1.0 psi** or greater then the check valve is holding tight.

- IN CLOSING -

1. Close all test cocks on DCVA.
2. Open customer hose bibb for flushing if possible.
3. Slowly open both shut-off valves on DCVA.
4. Allow water to flow for a minute from the open hose bibb.
5. Close hose bibb.
6. Check with customer, flush a toilet, and/or run some water within the facility if possible before leaving.

ALL VALVES ON THE TEST KIT SHOULD BE OPENED AND THE KIT ALLOWED TO DRAIN PRIOR TO STORAGE. THIS IS ESPECIALLY IMPORTANT DURING COLD WEATHER DUE TO THE DANGER OF FREEZING.

NOTE** THE ABOVE TESTING PROCEDURE IS CONDUCTED WITH THE # 1 SHUT-OFF VALVE IN THE CLOSED POSITION. THIS MEANS THAT THE # 1 SHUT-OFF VALVE MUST NOT LEAK. OPEN TEST COCK # 2 AND INSPECT FOR CONTINUOUS LEAKAGE. IF # 1 SHUT-OFF VALVE IS LEAKING THEN YOU CANNOT USE THIS TEST. HOWEVER, THE VERTICAL TUBE OR DIFFERENTIAL PRESSURE TEST CAN BE USED ON DCVA'S WHERE SMALL LEAKAGE OCCURS PAST THE # 1 SHUT-OFF VALVE.

DIFFERENTIAL PRESSURE TEST USING A (3) VALVE DIFFERENTIAL GAGE

DOUBLE CHECK VALVE ASSEMBLY

Performed with the first shut-off valve open

This test is performed with the DIFFERENTIAL PRESSURE GAUGE test kit. As you will recall from the R.P. test, the differential pressure gauge simply measures the pressure drop across the check valve. This pressure drop is normally the same as the strength of the check valve spring. In using the differential pressure gauge to test the double check valve assembly, a minimum of 1.0 PSID is required for each check valve in order for that check valve to pass the test. Such a small reading is often difficult to read on most test kits. This is one of the drawbacks of this test. However, since the first shut-off valve is left in the open position for this test, it is possible to use this test when the first shut-off valve is leaking badly.

TEST PROCEDURE

PREP WORK:

- 1) Notify customer that the water service will be off. Identify the make, model, and serial number on the backflow device. Inspect that this is an approved assembly: 2-check valves, 2-shutoff valves, 4-test cocks. Observe the area to make sure there are no leaks.
- 2) Flush test cocks (1,2,3,4) then close all test cocks.
- 3) Install brass fittings in the test cocks.
- 4) Close shut-off valve # 2.

TEST CHECK VALVE # 1

- 1) Close all valves on test kit.
- 2) Connect the high side hose to test cock # 2, and the low side hose to test cock # 3. Open test cock # 2 and test cock # 3.
- 3) Open vent valve "C" and high "A" on the test kit to bleed the air from the high side of the kit. Close high "A" valve and then open low "B" valve to bleed the low side. Close low "B" valve.
- 4) Record the gauge reading. **It must be a minimum of 1.0 PSID in order to pass.** Close test cock # 2 and test cock # 3.

TEST CHECK VALVE # 2

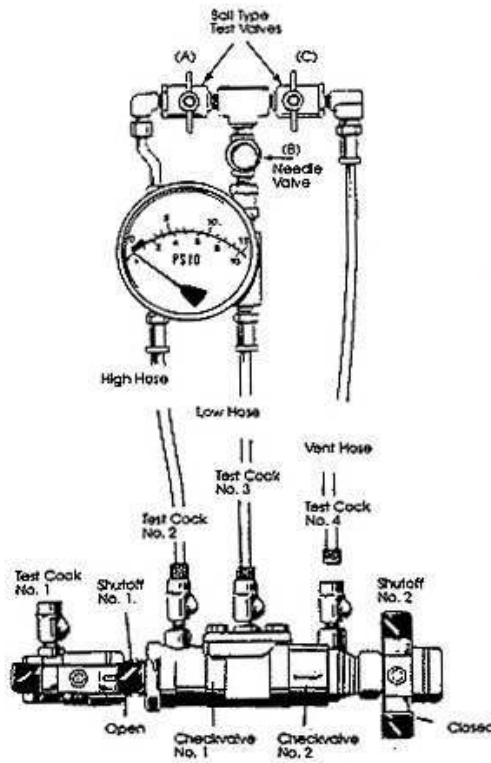
- 1) Move the high side hose to test cock # 3 and the low side hose to test cock # 4. Open test cock # 3 and test cock # 4.
- 2) Open vent "C" valve. Then open high "A" and bleed air from the high side of kit. Close high "A" valve, and then open low "B" valve and bleed the low side of kit. Close low "B" valve.
- 3) Record the gauge reading. **It must be a minimum of 1.0 PSID in order to pass.** Close test cock # 3 and test cock # 4. Remove hoses and test kit. **Slowly** open shut-off valve # 2 in order to restore water flow to the facility (placing the DCVA back into service.)

TEST FOR LEAKING # 2 SHUT-OFF VALVE

AS PREVIOUSLY MENTIONED, THE ABOVE TEST IS NOT ACCURATE WHEN THE SECOND SHUT-OFF VALVE IS LEAKING. THE FOLLOWING TEST WILL EXPOSE A LEAKING SHUT-OFF VALVE.

- 1) Both shut off valves should be open. Make sure all valves on test kit are closed. Connect the high "A" hose to test cock # 2 and the low "B" hose to test cock # 3. Open test cock # 2 and test cock # 3.
- 2) Open the high "A" valve and vent "C" valve to bleed air from high side of gage. Open low "B" valve to bleed air from low side of gage. Close valves "A", "B", and "C" on test kit.
- 3) Connect the vent "C" hose to test cock # 4. Open test cock # 4.
- 4) Close shut off valve # 2. The differential gage needle should read at least **1.0 PSID** in order to pass.
- 5) Open the high "A" valve and vent "C" valve. This will put back pressure on check valve # 2.
- 6) Close test cock # 2.

IF GAUGE IS STEADY THEN SHUT-OFF VALVE # 2 IS HOLDING TIGHT. HOWEVER, IF GAUGE DROPS TO ZERO PSID THEN SHUT-OFF VALVE # 2 IS LEAKING. IF THE GAUGE RISES THEN THE SHUT-OFF VALVE IS STILL LEAKING, BUT IS UNDER BACK PRESSURE FROM THE FACILITY.



TEST PROCEDURE USING A (3) VALVE DIFFERENTIAL GAGE

REDUCED PRESSURE BACKFLOW PREVENTER

TEST SET UP

Notify customer water will be off, inspect device for leaks, and verify the make, model, & serial number.

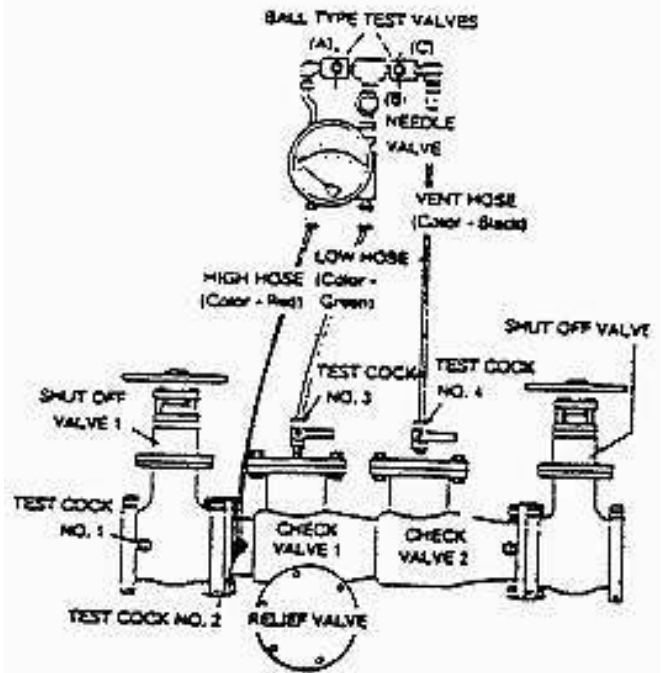
Flush test cocks in order (4-1-2-3), without making the relief valve open, then install brass fittings.

Close valves "A", "B", "C", on test kit and close the # 2 shut-off valve.

Connect high hose to test cock # 2, and low hose to test cock # 3.

Slowly open test cock # 3, then open vent "C" valve and low "B" valve. This will bleed air from low side of gage. Slowly open test cock # 2, then open high "A" valve. This will bleed air from high side of gage. Close valve "A", then valve "B", then valve "C".

Observe this **apparent** differential pressure for check valve # 1, this value must be at least 5.0 PSI or greater.



TEST NO. 1

Purpose: To test check valve # 2 against back pressure.

Connect the vent "C" hose to test cock # 4. Slowly open the high "A" and vent "C" valves and keep the low "B" closed. Open test cock # 4.

Gage may decrease slightly due to disc compression. If pressure differential continues to decrease until the vent opens, then check valve # 2 is reported as leaking.

TEST NO. 2

Purpose: To test shut-off valve # 2 for tightness.

After passing test No. 1 continue to test No. 2 by closing test cock # 2. The indicated pressure differential will decrease slightly. If pressure differential continues to decrease (approaching zero) the No. 2 shut-off valve is reported to be leaking

TEST NO. 3

Purpose: To test check valve # 1 for tightness.

Close high "A" valve and open test cock # 2. Close test cock # 4. Disconnect vent hose at test cock # 4. Open low valve "B", this will bleed air from low side of gage, then closing valve "B" restores the system to a normal static condition.

Observe the pressure differential gage, this value must be at least **5.0 PSI or greater**. Record this value for check valve # 1 on the backflow test report form.

TEST NO. 4

Purpose: To test operation of the differential pressure relief valve.

The pressure differential relief valve must operate to maintain the "zone" between the two check valves at least 2 psi less than supply pressure. Close vent "C" valve. Open the high "A" valve. Slowly open the low "B" valve no more than 1/4 turn. Hold the valve at this position and observe the gage reading at the first moment the first discharge is noted from the relief valve. Record this as the opening differential pressure of the relief valve on the test report form.

On the back of this page is a differential pressure test for check valve # 2. Check valve # 2 must be at least 1.0 psi or greater.

DIFFERENTIAL PRESSURE TEST ON CHECK VALVE # 2

Check valve # 2 must be at least 1.0 psi or greater

Test # 5 is a required test. In addition to test # 1 which is a back pressure test on check valve # 2, you must perform this differential pressure test to confirm the true integrity of check valve # 2.

TEST NO. 5

Purpose: To do a differential pressure test instead of a back pressure test on check valve # 2.

After completing test No. 4 close test cock # 2, then close test cock # 3. Close valves "A", "B", and "C" on test kit.

Move low hose "B" to test cock # 4, then move high hose "A" to test cock # 3.

Slowly open test cock # 4, then open vent "C" valve and low "B" valve. This will bleed air from low side of gage. Slowly open test cock # 3, then open high "A" valve. This will bleed air from high side of gage. Close valve "A", then "B", then "C".

Observe the differential pressure gage, this value must be at least **1.0 psi or greater**. Record this value for check valve # 2 on the backflow test report form.

End of test. Make sure all test cocks are closed. Remove hoses and fittings. Slowly open shut-off valve # 2 to restore water supply to the customer.

TEST PROCEDURE USING A (3) VALVE DIFFERENTIAL GAGE

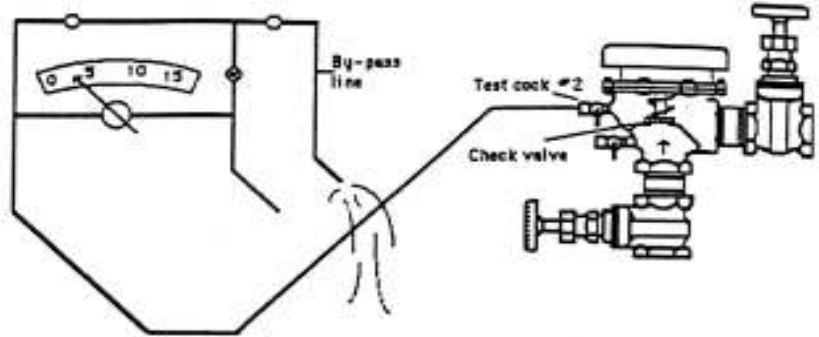
PRESSURE VACUUM BREAKER

TEST SET UP

Notify customer water will be off, inspect device for leaks, verify the make, model & serial number.

Flush test cocks and install brass fittings. **REMOVE CANOPY.**

Close valves “A”, “B”, and “C” on test kit, and close the # 2 shut-off valve.



TEST NO. 1

Purpose: To test the air inlet valve.

Attach the high “A” hose to test cock # 2. Open test cock # 2 very slowly. Open the high “A” valve and vent “C” valve to expel air from the gage. Close the vent “C” valve. Close the # 1 shut-off valve. Pressure is now captured in the PVB.

The gage diaphragm and low hose must be level with test cock # 2 and/or the area between the check valve and the air-inlet valve.

Very slowly open the vent “C” valve with your finger on top of the air-inlet valve. The air-inlet valve must open at least **1.0 psi or greater**. Record this value on the test report form.

Close high “A” valve and vent “C” valve.

TEST NO. 2

Purpose: To test the check valve

Close test cock # 2 and remove the high “A” hose from test cock # 2. Open shut-off valve # 1.

Attach high “A” hose to test cock # 1. Open test cock # 1 very slowly. Open high “A” valve and vent “C” valve to expel air from the gage. Close the vent “C” valve. Close the # 1 shut-off valve. Pressure is now captured in the PVB.

Again: The gage diaphragm and low hose must be level with test cock # 2 and/or the area between the check valve and the air-inlet valve.

Open test cock # 2. When water stops running out of test cock # 2, record this value on the test report form. This check valve must be at least **1.0 psi or greater**.

End of test. Make sure all test cocks are closed. Remove hose and fittings. Place canopy back on PVB. Open shut-off valve # 1 and then shut-off valve # 2.

A PVB must be installed 12" above all fixtures installed down stream and is not approved for back pressure. To verify the PVB is 12" above the highest open fixture or irrigation head, close the # 1 shut-off valve. Open test cock # 2, then open shut-off valve # 2. If water continues to run out of test cock # 2, there is back pressure on the PVB or it is below the highest fixture or irrigation head.

WHERE TO SEND YOUR DIFFERENTIAL PRESSURE GAUGE FOR CALIBRATION

Gauge calibrations for the differential pressure gauges used in the backflow prevention testing may be calibrated as follows:

The following test kits may be mailed to:

Watts: TK-9, TK-9A, and TK-99E

Orange Research, Inc.
Mr. Don Malizia
140 Cascade Blvd.
Milford, Conn. 06460
Phone (203) 877-5657

**THE GAUGE ITSELF MUST BE REMOVED FROM THE REST OF THE TEST KIT,
AND MAILED TO THE ABOVE ADDRESS.** Most often the gauge will not be calibrated, but a new one will be returned to you.

The following test kits may be mailed to:

Watts: TKDP, TKDR, TK99D, & all other differential gauges can be sent to:

Bavco
Mr. John Gould or Mr. Pedro Quraz
20435 South Susana Road.
Long Beach, CA 90810
Phone (310) 639-5231

The following test kits may be mailed to:

Midwest: Models 830, 844, 845-3, 845-5, 860, 890

Conbraco: Models 40-200 TK, 40-200 TK5

Ames: Model ATG

Mid West Instrument Co.
Mrs. Sue Darrow or Mr. Mike Lueck
6500 Dobry Drive
Sterling Heights, MI 48314
Phone (800) 648-5778 ext 106 or 120

**THE ENTIRE GAUGE AND CASE MUST BE MAILED TO THE ABOVE
ADDRESS. YOU MUST ALSO CALL (800) 648-5778.**

The following test kits may be mailed to:

Midwest: Models 830, 844, 845-3, 845-5, 860, 890

Conbraco: Models 40-200 TK, 40-200 TK5

Ames: Model ATG

Speciality Valve & Controls Company

Mrs. Mary Anne Kelly

3001 Griffith Street

Charlotte NC 28203

Phone (704) 522-9873

The following test kits may be mailed to:

Promaster: ASRP4, ASDC4, & all other differential gauges can be sent to:

Astra Industrial Services, Inc.

Mrs. Kathy Frahm

3525 Old Conejo Rd.

Suite 104

Newbury, Ca. 91320

Phone (800) 776-1464

The following test kits may be mailed to:

ITT Barton: Model 246 & 247

Nuflo Measurement Systems

Mr. Ben Fuentes

2500 Steven Road

Odessa, Texas 79764

Phone (800) 535-8753

In addition to the above locations (which are manufacturers), you may contact any qualified local vender or shop and have your gage calibrated. You may want to check and compare the price before agreeing to the work.